



FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS



First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 893. (No. 5, Vol. XVIII.)

FEBRUARY 4, 1926

Weekly, Price 6d.
Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.

United Kingdom .. 30s. 4d. Abroad 33s. 0d.*

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* Foreign subscriptions must be remitted in British currency.

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926

Feb. 25	Mr. A. J. Cobham. "Long-Distance Aero-plane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.S. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	Flight-Lieut. H. Cooch. "Landing Aero-planes in Fog," before R.Ae.S.
April 13	Mr. S. H. Evans, B.Sc. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.
April 15	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 21	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.

EDITORIAL COMMENT.



A Very Gallant Effort

ONCE more it becomes our pleasant duty to place on record the successful accomplishment of a very fine flight. We refer, of course, to the flight from Spain to South America by the Spanish aviators Comandante Franco (pilot), and Capt. Ruiz de Alda (navigator), Lieut. Duran, and Sen. Rada. A brief account of the adventurous undertaking is given elsewhere in this issue of FLIGHT, from which it will be seen that the aviators left Palos (the point of departure of Christopher Columbus in 1492) on January 22, and arrived at Pernambuco on January 28, having covered the distance of about 3,500 miles in a lapsed time of one week, and in a flying time of about 35 hours, or at an average speed of close upon 100 m.p.h. The longest "jump" was from the Cape Verde islands to Fernando Noronha, a distance of roughly 1,500 miles, which was accomplished in a little more than 14 hours.

It is a testimony to the reliability, airworthiness and seaworthiness of the modern flying boat that the Spanish crossing of the South Atlantic was accomplished during a period when an extremely severe gale raged in the North Atlantic, resulting in delay and damage to shipping, and in more than one actual shipwreck. It may be, of course, that the prevailing winds over the route followed by the Spanish aviators were in their favour and helped them to make such excellent time, but for all that, there was an opportunity for the machine to show its quality when it came down off Fernando da Noronha and the aviators had to spend the night on board, as the sea was too rough for them to be transferred to the destroyer standing by. Obviously the days have gone when seaplanes were fair-weather craft, and the Spanish flight has provided one more proof that in time we may reasonably hope to evolve seaplanes which will do as a normal part of their routine work flights which as yet are to be regarded mainly as isolated "dashes." For having furnished that proof the aviation world owes a debt of gratitude to the four intrepid Spaniards whose daring attempt has just been crowned with success.

The flight is claimed, and not unnaturally so, as a Spanish performance. Actually it was a very international affair. The crew were Spanish. The machine, a Dornier "Wal" was designed by the well known German designer, Claudius Dornier, of Friedrichshafen, on Lake Constance, and built under licence in Pisa, Italy. The two 450-h.p. engines were Napier "Lions," designed and built at Acton, London, and a great number of the instruments used were of British manufacture. Thus Great Britain can justly claim what one may, perhaps, be forgiven for terming the "Lions' share" in the adventure. That the "Lions" did their duty and did it well is amply evident, and it is a testimony to their stamina that when the propeller of the rear engine was damaged by the rough seas, the last part of the flight was completed with only one of the engines at work. This must necessarily have meant that after having been run for some 33 hours (a good deal of the time at or near maximum power) one of the "Lions" was then run to its full capacity for the last 100 miles or so. Yet apparently it was none the worse for its gruelling test.

One begins to realise the vast possibilities of a three-engined flying-boat, in which the stoppage of one engine deprives the machine of but one-third instead of one-half of its engine power. In this particular case the stoppage was, of course, due solely to the propeller and not to the engine.

We extend our heartiest congratulations to everyone concerned in this splendid flight, and wish the Spanish aviators all possible good fortune on the further stages of their flight.

Economy and Security

The eleventh annual report of the American National Advisory Committee for Aeronautics has just come to hand, and although it is, of course, the administrative report without the technical reports, there is much in it of interest to British readers. On the subject of the American aircraft industry, a passage occurs which we quote below, as it has a very distinct bearing upon the position in this country at the present time. The passage, which is headed "The Problem of the Aircraft Industry," reads as follows: "In its tenth annual report, the committee outlined the relation of the aircraft industry to national defence, and emphasised the need of maintaining a satisfactory nucleus of an industry. This was defined as 'a number of aircraft manufacturers distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the Government's needs in an emergency.' The committee presented certain definite suggestions of steps to be taken by the Government and by the industry to meet the situation that existed at that time. There has been substantial progress during the past year along the lines outlined by the committee, and it is believed that the condition of the industry and the relations of the Government to the industry have been much improved. *The greatest single factor in bringing about*

this improved condition has been the increased volume of Government orders for aircraft made possible by increased appropriations and contract authorizations for the purchase of aircraft. The present situation, on the whole, may be regarded as more satisfactory at this time, and as offering promise of further improvement."

The italics are ours. The fundamental principles involved are the same in America as here, and this statement, coming from the body governing research in the United States, draws attention to a basic fact which, if rumour be true, is apparently being overlooked in this country at the present time. It is accepted as a piece of reliable information that in the forthcoming Air Estimates it is intended to suggest considerable reductions in air expenditure, and particularly that these reductions are to be effected under Vote 3A (aeroplanes, seaplanes, engines and spares).

At the luncheon given by the Air League of the British Empire recently, Mr. Fairey stated the position fearlessly, clearly and, we think, moderately. The British Aircraft industry has settled down under the present conditions to steady progress, but it will take but very little to upset the balance, as the number of orders that have been received by the industry have been only just sufficient to keep all the twenty or so firms in the industry, and that to a very large extent because it had been accepted as a definite understanding that the present rate of expansion would be maintained for several years. If that expansion is slowed down, more than one aircraft firm will have to close down, and designing staffs will be lost. For each firm closing down the Royal Air Force would be deprived of the supply of machines which that firm could, and would, provide in time of emergency. It is estimated that the British aircraft industry as at present composed, is just sufficient to meet an emergency, should it arise. A reduced industry, would *not* be sufficient, and the proposed "cuts" would seriously hamper the air forces and would actually, in the opinion of many, reduce our "factor of safety" to a dangerous extent.

The American N.A.C.A. annual report shows how seriously America is treating her air problem. Yet America's position is in no way comparable with ours, and the time when an air attack on the United States becomes a possibility is still a long way out in the future. In the case of Great Britain, every day, every step forward in progress, adds to the risk we are running. Research is necessary if we are to progress, but orders for machines and engines are a vital necessity if our industry is to be kept alive. Yet, apparently, those in authority are contemplating not merely a slowing-up of progress but the decimation of that industry. Truly, the slogan "Wake up England," was never more needed than at the present time, and it is to be hoped that the general press will unite in using its influence to prevent from being made what we feel would be one of the most disastrous mistakes of recent years.

The Spanish Transatlantic Flight

The Air Ministry announces that Sir Samuel Hoare, has sent the following telegram to the Minister of War, Madrid:—"Air Council have learned with great pleasure of successful completion of Transatlantic flight by Comandante Franco and Captain Alda. They desire to offer Spanish Army Air Service cordial congratulations on most brilliant achievement."

D. Napier and Son, Ltd., have received from Sir Samuel Hoare, Secretary of State for Air, the following telegram:—

"I congratulate you on fresh success secured by Napier engines in Transatlantic flight by Spanish Army Air Service. This achievement is one more proof of the unexcelled reliabilities of the products of the British aircraft manufacturing industries."

THE SPANISH TRANSATLANTIC FLIGHT

ONCE again has the Atlantic been crossed by air, for Comandante Franco, accompanied by Capt. Ruiz de Alda (navigator), Lieut. Duran, and engineer Rada, who left Palos de Moguer, Spain, on January 22, has succeeded in reaching Pernambuco, Brazil, in the Italian-built Dornier-Wal flying-boat, fitted with two Napier "Lion" engines.

As briefly reported last week, they successfully completed the first stage of about 900 miles to Las Palmas (Canary Is.) on January 22, when bad weather prevented a resumption of the flight until January 26. They then completed another stage, of roughly 1,000 miles, to Cape Verde Islands. In the early hours of the morning of January 30, they set out on the most difficult section of the journey—a flight of 1,500 miles across the Atlantic Ocean to Fernando Noronha, an island some 300 miles off the coast of Brazil.

Just before eight o'clock that evening they were sighted from the island of Fernando Noronha, and shortly after passed overhead in the direction of Pernambuco. They had not gone far however, when they were seen to descend on the sea and signal for assistance. It appears that as they were running short of fuel and weather conditions were getting somewhat rough, they decided it would be unwise to proceed.

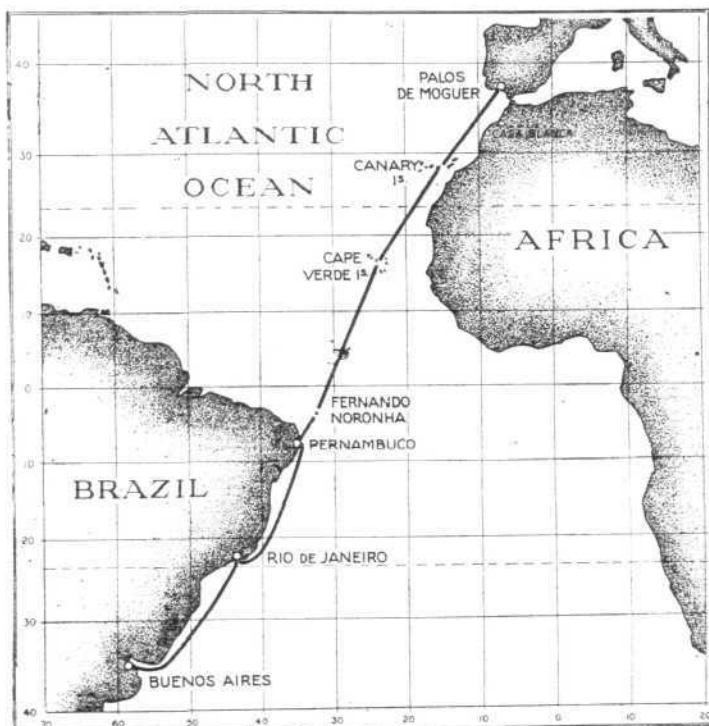
Eventually they succeeded in getting back into Fernando Noronha, but the sea was then so rough that boats were unable to reach the machine and take them ashore. Throughout the night, therefore, Comandante Franco and his companions were forced to remain on board the seaplane, "Ne Plus Ultra." On the whole, the machine rode out the storm well, but one of the propellers was damaged.

However, Comandante Franco had succeeded in accomplishing the second longest non-stop over-sea flight yet made (the longest was that made by the late Sir John Alcock on the occasion of his flight from Newfoundland to Ireland (1,890 miles) in 1919) having covered a distance of 1,500 miles in less than 14 hours.

At 3 p.m. next day they made a start for Pernambuco, 300 miles away. Just as they were within sight of their goal the propeller, previously damaged the night before, refused to carry on any longer, and they had to make a hasty conclusion (for about 100 miles) of their flight on only one engine. They did not, therefore, fly round the town of Pernambuco before landing, as originally intended, but landed just outside. Boats at once went to their assistance, and after the machine was safely made fast to its moorings, the airmen were taken on board a Brazilian destroyer and brought ashore. They were accorded a wonderful reception at Pernambuco.

success of the flight so far has caused immense enthusiasm both in Spain and South America, and Comandante Franco has received numerous congratulatory messages, including a cablegram from King Alfonso. Except for the engines and minor details the "Ne Plus Ultra" is similar to the Dornier flying-boats used by Amundsen in his recent Polar flight.

It has been specially equipped for this Transatlantic trip with a Marconi AD6 aircraft telephone transmitter and



THE SPANISH TRANSATLANTIC FLIGHT:—Sketch map showing the route of the Spanish flight from Spain to South America.

receiver of the type which has been adopted as the standard wireless telephone fitting for British civil aircraft, and which has rendered good service on commercial airways in many



[Photo.: Marconi Co.]

THE SPANISH TRANSATLANTIC FLIGHT: The Dornier-Wal metal mono flying-boat, fitted with two Napier "Lion" engines, on which Maj. Franco flew from Spain, across the Atlantic, to Pernambuco.

on their arrival, enormous crowds lining the three miles of quays cheering enthusiastically, whilst ships and tugs in the harbour supplied the triumphal Jazz march.

The total distance flown up to now is about 3,800 miles, and the total flying time amounts to 35 hours 20 mins—or at an average speed in the neighbourhood of 100 m.p.h. The

parts of the world. A Marconi type 14 direction finder has also been fitted for navigational purposes, and the Marconi Company has arranged with its affiliated wireless companies in South America to keep in touch with the aeroplane when it approaches South America and as it is flying along the coast from Pernambuco to Buenos Aires.

THE "TRAVEL AIR SPECIAL"

An Efficient American General Purpose Machine

In order to meet an exceedingly popular demand that exists in America for a small, medium-powered machine, for fast passenger or express-carrying cross-country work, several of the aircraft constructing firms in America have concentrated their efforts in this direction. One such machine, described herewith through the courtesy of our American contemporary, *Aviation*, is the "Travel Air Special," which put up an excellent performance in last year's Ford Reliability Aeroplane Tour.

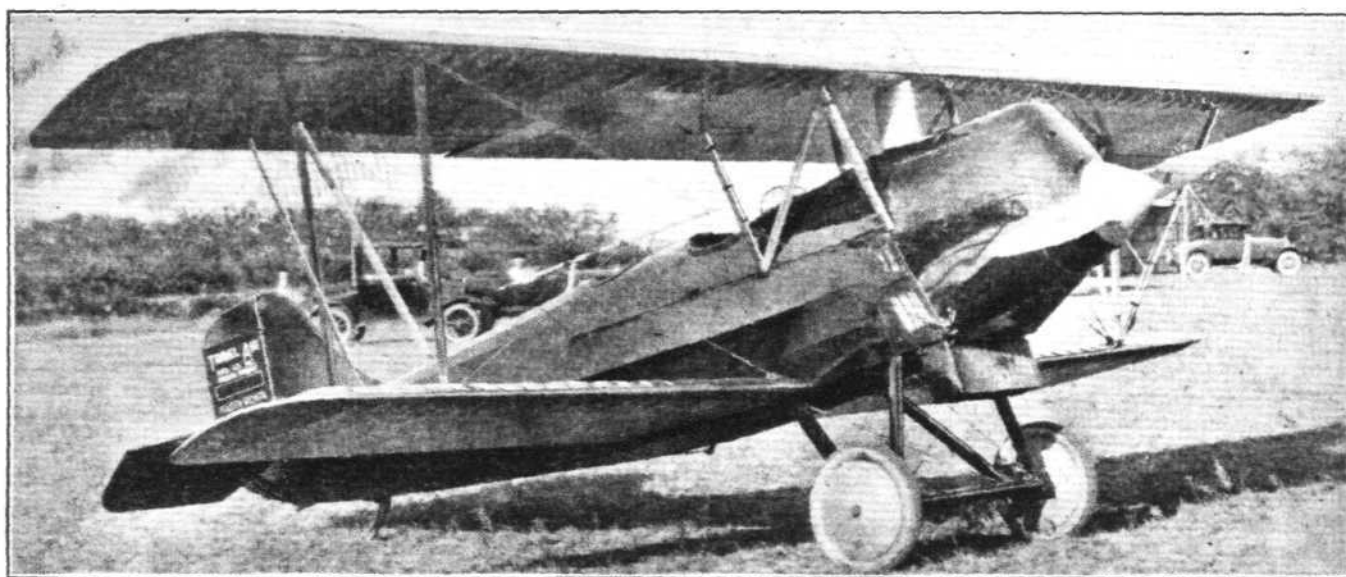
This machine, which is produced by the Travel Air Manufacturing Co., of Wichita, Kan., was designed by Lloyd Stearman and MacShort, engineers of the company. Perhaps one of the most interesting, and certainly very significant, features of the design is the fact that the designers have kept their production within strict accord with the specifications laid down by the Aeronautical Safety Code.

It is worthy of note that six weeks after the decision was arrived at by the executives of the company to construct

A total seating capacity for four persons is provided on this machine, the rear cockpit being very large, with dimensions, that permit the seating of the pilot and a passenger. The controls are so arranged that they can be off-set to allow for the lateral shifting of the pilot's position.

The forward cockpit—located at the trailing edge of the top plane—seats two persons, and entrance to it is effected by a convenient door in the fuselage. If required, this cockpit can readily be converted into an express goods or mail compartment of 22 cub. ft. capacity. Furthermore, if dual control is desired, forward cockpit controls can be installed quickly. Luggage is accommodated in a compartment located directly back of the pilot's cockpit.

A Curtiss C 6 A (160 h.p. at 1,750 r.p.m.) engine is installed, well cowled in. A free air radiator is mounted under the engine, and water temperature is controlled by retracting the radiator into the engine compartment and shuttering the exposed surface.



THE "TRAVEL AIR SPECIAL": An American four-seater commercial biplane, fitted with a Curtiss C 6A 160 h.p. engine.

the machine, it had been flight tested and entered in the Air Meeting held at Tulsa, Oklahoma, during the first week of September last. As an example of rapid construction of an entirely new design, the accomplishment is remarkable, especially when it is recalled that production of the standard model was not licensed during this period.

In some respects the "Travel Air Special" possesses several of the characteristics of the standard OX model produced by this firm. The fuselage is of welded steel tubing with bracings of tubing and wire. The engine mounting, also of steel tubing, is made a detachable unit.

The wings are of wood and fabric construction with box spars and built-up ribs, and interplane bracing is secured by N struts of streamline steel tubing, together with streamline bracing wires. The upper plane, which is larger in span and chord, is straight, and is supported above the fuselage by two pairs of N struts. It is in three sections—two outer ones attached to a small centre panel. The ailerons, mounted in the top wings only, are operated by the standard Travel Air method of push and pull rods carried in the lower plane, thence through bell cranks and aileron struts. By this means the elimination of pulleys in the control system has been made possible.

The tail surfaces are of steel tubing and stamped steel ribs, the horizontal surface being adjustable as to incidence from the cockpit—a refinement, desirable, but not usually found on machines of this type.

The cleanness of design throughout is apparent from the accompanying illustration—the streamlining of the landing gear and exposed fittings having been carried out in detail.

The excellent performance of the "Travel Air Special" has been demonstrated at the Tulsa meeting, and in the Ford Reliability Tour. Walter Beach, manager of the Travel Air Co., piloted the machine in these events, and it may be mentioned that this was one of three Travel Air machines that finished the Ford Tour with a perfect score.

The principal characteristics of the "Travel Air Special" are:—

Span (top)	31 ft. 6 in.
Span (bottom)	25 ft. 2 in.
Chord (top)	5 ft. 0 in.
Chord (bottom)	4 ft. 0 in.
Height	8 ft. 8 in.
Total wing area	240 sq. ft.
Weight, empty	1,460 lbs.
Weight of pilot, fuel, oil, &c.	582 lbs.
Normal pay load	500 lbs.
Weight, fully laden	2,542 lbs.
Weight, per sq. ft.	10.6 lbs.
Weight, per h.p.	15.9 lbs.
Speed range	48-120 m.p.h.
Cruising range (100 m.p.h.)	5 hours.
Fuel capacity	57 gals.
Oil capacity	5 gals.

A Night Flight from Paris

A FRENCH Farman Goliath, piloted by M. Codon, made a night flight between Paris and Croydon on January 27.

Col. Mitchell's Sentence Modified

It is announced that President Coolidge has modified the Court-martial sentence passed last December on Col.

Mitchell, of the U.S. Air Service, to the extent that Col. Mitchell shall receive all his Army allowances and half his pay during the five years' suspension.

Swiss Pilot Killed

THE Swiss pilot Lieut. Reichwein was killed in an aeroplane accident at Wohlen on January 26.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SCHNEIDER INTERNATIONAL SEAPLANE RACE, 1926

THE Schneider International Seaplane Race will be held in Norfolk, Virginia, U.S.A., on October 24, 1926. British entries, together with entry fee of £5 and the deposit of £50, must be received by the Royal Aero Club, not later than Monday, March 22, 1926.

GORDON BENNETT BALLOON RACE, 1926

BRITISH entries for the Gordon Bennett Balloon Race, 1926, together with entry fee £10, must be received by the Royal Aero Club, not later than Monday, March 22, 1926. The Race for the Gordon Bennett Balloon Cup will be held during the month of May. The exact date will be announced later.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Members will be held at 3, Clifford Street, London, W.1, on Wednesday, March 31, 1926, at 6 p.m.

Notices of Motion.—Notices of Motion signed by at least five members, must be received not less than 21 days before the meeting.

Election of Committee.—Nominations for the Committee, signed by two Members, must be received not less than 14 days before the Meeting.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1.
H. E. PERRIN, Secretary

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

FLYING instruction was only possible on two days during the past week and then only to a very limited extent. With one D.H. "Moth" only available the total flying for the week was eight hours. The following members had flying instruction:—J. S. M. Michie, F. C. Elford, Mrs. Atkey, S. C. Richards, R. C. Brighten, Sir John Rhodes, W. Hay, R. P. Cooper, S. O. Bradshaw, H. R. Ogston, H. O. Richardson, C. E. Murrell, P. Johnson, N. Jones, K. V. Wright, H. R. Thomas.

Solo flights were made by G. H. Craig and Mrs. Elliott-Lynn.

The total flying time for the month of January was 53 hours 15 mins., and practically all this has been done on the one machine.

The Lancashire Aero Club

FLYING took place on Friday, Saturday and Sunday.

Mr. Scholes being away for the week-end on some nefarious work, the whole of the flying devolved on Mr. Cantrill.

The following victims had "dual":—Messrs. C. A. S. Parker, B. H. Smith, T. Hardy, C. Colley, R. Tummers, H. Michelson, H. S. Stern, K. R. Williams, J. Goodyear, T. Wilkinson, M. Lacayo, C. Crabtree, J. H. Chadwick. Mr. Lacayo did 5 mins. solo. Total flying time was 8 hours 35 mins. Tests occupied 20 mins.

There is now quite a queue of people waiting to go for their tickets, but whilst our barograph "graphs" quite well it persistently refuses to "baro." When this is remedied we hope to develop "A" licences like mushrooms.

The Newcastle-upon-Tyne Aero Club

TOTAL flying time for the week ending January 31, 1926, 11 hours 50 mins.

Dual Instruction, with Major Packman.—Miss C. R. Leathart (3 flights 1 hour 45 mins.); Mr. J. A. Somerville (2 flights, 65 mins.); Mr. G. H. Twine (30 mins.); Mr. J. D. Irving (2 flights, 65 mins.); Mr. J. Bell (20 mins.); Mr. C. Thompson (30 mins.); L. Smith (2 flights, 60 mins.); J. M. Campbell (15 mins.); Mr. A. D. Bruce (30 mins.).

Solo.—Mr. P. F. Heppell, 3 flights totalling 1 hr. 15 mins., with the following as passengers:—Mr. I. Stanley, Mr. H. Ellis and Mr. Nettleton. Mr. W. Baxter Ellis, 2 flights, with Mr. Metcalf and Mr. Sutherland as passengers. Mr. Thompson, 2 flights—35 mins.

Passengers with Major Packman:—Miss Skelton, Miss Tommay, Miss Cochrane.

The propeller of LX was damaged on Saturday, just before noon, but a new one was delivered, from De Havilland's at night and the machine was hard at work again by 10.30 on Sunday morning. The promptness of despatch of this necessary item of "Moth" equipment enabled flying to be carried out on Sunday as usual, though many members were disappointed on Saturday afternoon. Despite all the efforts of those members who have flown during the month, "Novocastria" (LX) finished up in perfect trim, with 62 hours 11 mins., of the total of 69 hours 24 mins., for the month to her credit.

Mr. Ellis's "Gull" has now grown its wings, and, possibly because it is rather large for that portion of the hangar allotted to it, Mr. Brown is busy clipping its wing (tips). The engine is now on rail, and it is hoped to have it in the air very soon.

THE AIRSHIP CLUB

The Airship Club was inaugurated on January 31 at a meeting held at 3, Clifford Street, London, W.1, when Mr. Griffith Brewer, Chairman, moved and Lieut.-Col. the Hon. Claude Brabazon seconded "that the Airship Club now be formed." The resolution put to the meeting was carried unanimously. The following members were elected and requested to serve on the Committee:—

Capt. W. G. Aston.
R. M. Balston, Esq.
Lieut.-Col. the Hon. Claude Brabazon, O.B.E. (late Irish Guards).
Comdr. F. Boothby, O.B.E., R.N. (retired).
Griffith Brewer, Esq., Chairman.
The Lord Cunliffe.
The Hon. F. Eveleigh de Moleyns.
Lieut.-Col. Lockwood Marsh, C.B.E.
Lieut. R. L. Preston, Coldstream Guards.
Maj. C. C. Turner, R.A.F. (retired).
Wing-Commander A. C. Winter, R.A.F.

It was resolved that a limited company be formed to take over the assets and liabilities of the Airship Club, the company to be called "Airship Clubs, Ltd.," with a capital of £100 divided into 2,000 shares of 1s. each. Each director to hold

one share, and to be a member of the Committee of the Airship Club.

Formal applications made to the Air Ministry for the club to be recognised and granted a subsidy accorded at present to light aeroplane clubs, and permission to use the airship shed at Pulham with the use of a portion of the officers' mess, was requested.

It is proposed to acquire an airship of 70,000 cub. ft. capacity fitted with two Cirrus engines as the club training ship, and arrangements have been made whereby members of the club may purchase small airships of 44,000 cub. ft. capacity fitted with one Cirrus engine or two Blackburne engines for £2,000 or £2,300 respectively. It is hoped to arrange for the use of the airship shed at Moreton, near Dorchester, which would be convenient to naval officers.

Applications for membership, enclosing the first year's subscription (£3), should be forwarded to Griffith Brewer, Esq., Chairman of the Airship Club, c/o The Royal Aeronautical Society, 6, Albemarle Street, W.1.

It is decided that members should pay a subscription of £3 per annum and 30s. per hour flying time, with a small extra fee for instruction as pilots for those who desire it.

F. L. M. Boothby, R.N. (retired),
Hon. Secretary.

H.M.S. "Glorious" as Aircraft Carrier

THE cruiser H.M.S. "Glorious"—which was completed in 1917—is to be converted into an aircraft carrier, and £100,000 has been set apart, as a first instalment for this

work, in the Navy Estimates. Owing to the closing down of Rosyth, where such work is allocated, the "Glorious" has been transferred to Devonport Dockyard, where the "Courageous"—a sister ship—is being similarly converted.

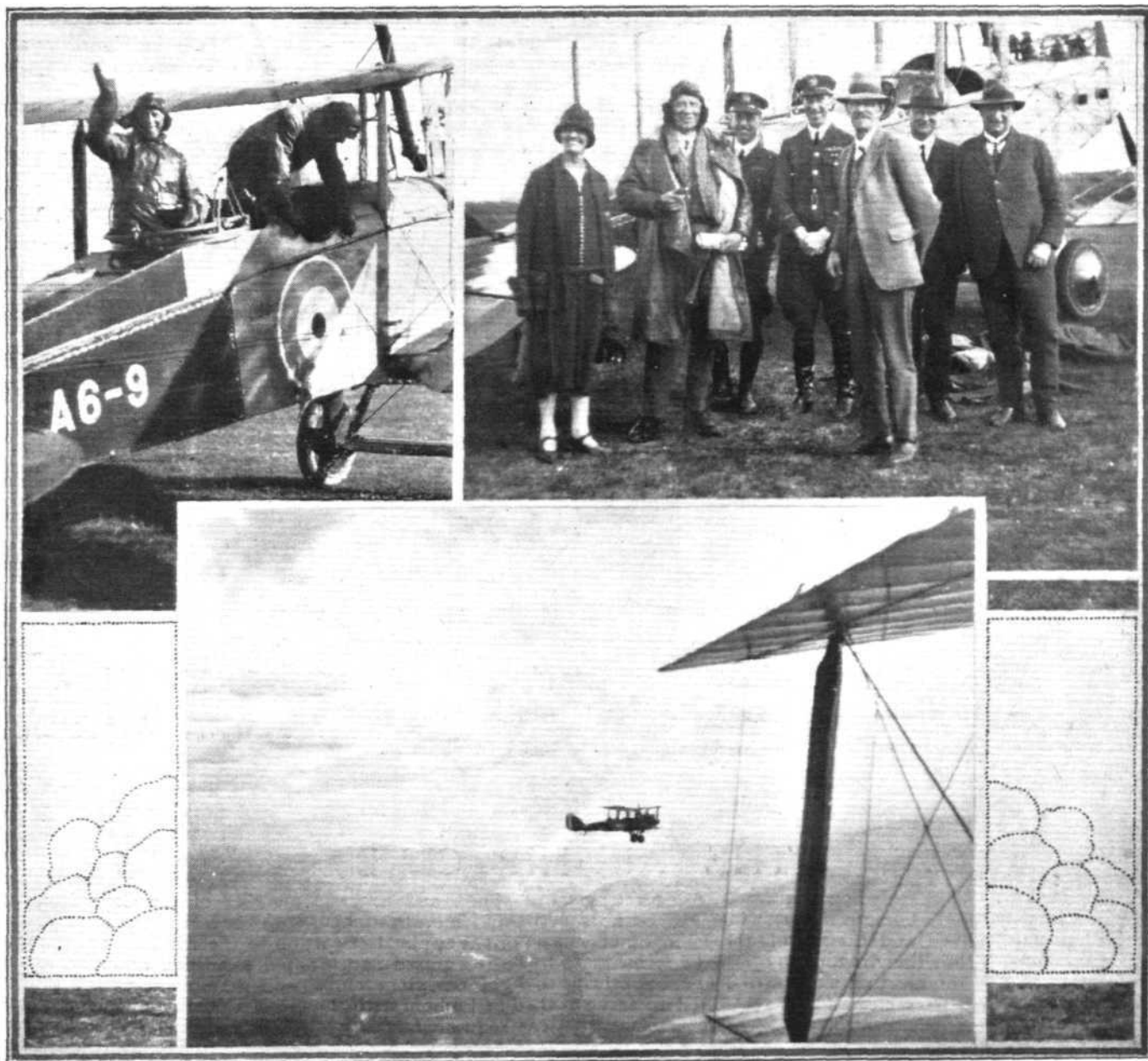
SIR HARRY BRITTAIN'S FLIGHT IN AUSTRALIA

ALMOST every day one sees further use being made of aircraft as a means of efficiently and quickly fulfilling certain missions—but even so we feel convinced that business and professional men could considerably extend this use if only they would appreciate the advantages and possibilities awaiting them in the employment of aircraft.

As a case in point, Sir Harry Brittain, M.P., a Director of D. Napier and Son, Ltd., has recently returned from a tour

Thus, he was able to see more of the country—and thereby obtain a considerable amount of data—in that one day than the other delegates could have seen in weeks.

For his flight Sir Harry started from the headquarters of the Royal Australian Air Force, Point Cook aerodrome, 15 miles from Melbourne. Incidentally, this aerodrome is ideally situated as it is right on the sea where seaplanes also operate. He used one of the R.A.A.F. D.H. 9's (240 h.p.



SIR HARRY BRITTAIN'S AUSTRALIAN FLIGHT: Our illustration shows, on the left (top), Sir Harry Brittain, M.P., about to start on his recent aerial tour of Victoria from Point Cook aerodrome. On the right he is seen on his arrival at Ehuca with the Mayor (third from right) and his daughter (extreme left), and his pilot (centre), F/O. B. E. Wilson, R.A.A.F. Below is a view of Sir Harry's D.H.9, taken from another machine whilst flying at 2,000 ft. near the Mountains of Ararat.

of the world in connection with the third Imperial Press Conference. While Sir Harry was in Australia, where this conference was held, he read a paper on "Inter-Empire Air Communications," and of course took the opportunity of studying the air communications existing in that country. Naturally, he was somewhat restricted as to time, so he gladly availed himself of an opportunity of a flight round Victoria, and in one day he covered approximately 700 miles.

Siddeley "Puma"), and was piloted by Flying-Officer B. E. Wilson, R.A.A.F. During his tour of Victoria he passed over Geelong, the Ararat Mountains, Bendigo, a big mining town, to Ehuca on the borders of New South Wales, and Victoria.

The Australian Air Force at the present moment is composed chiefly of gift machines, although latterly newer types have been purchased, among which may be mentioned the Supermarine-Napier "Seagull" amphibian, a number of which are being despatched during the next few weeks.

Governor of Punjab

On January 25 Sir Malcolm Hailey, Governor of the Punjab, flew from Lahore to Rawal Pindi in a D.H. 9A biplane,

and thus commenced an aerial tour of this district—the first time an Indian Provincial Governor has employed an aeroplane for official duties. Let us hope the habit will spread.

HOW TO BECOME A SERVICE PILOT

ENQUIRIES are constantly received by the Editor of *FLIGHT* from correspondents who wish to become pilots in one or other branch of the air force, but who do not know which branch to select or what step to take first. A certain mystification on the part of the most intelligent inquirer is more than excusable, for the dull blue uniform, which typifies the normal hue of the British skies, covers a greater multitude of services than can contrive to hide beneath the dark blue of the navy or the khaki of the army. During the war some people did get confused among R.N., R.N.R., R.N.V.R., and R.N.A.S.; and some dear old ladies were overheard arguing as to whether Lord Kitchener's army was better than the army of King George. But when it comes to all the air forces, Royal and otherwise, one may be excused for recalling and adapting the lines of Lewis Carroll:—

But it fairly lost heart, and outgrabe in despair,
When the *fifth* repetition occurred.

Yes, Dear Reader, though you may find it hard to believe, there are five categories of commissioned pilots serving H.M. the King—and even that leaves out of account the naval officers who are piloting in a seconded, attached, posted, or other capacity. Let us enumerate the five categories.

1. Officers of the Royal Air Force, regular and permanent.
2. Officers of the Royal Air Force who are regular but not permanent, holding only short service commissions.
3. Officers of the Royal Air Force Reserve.
4. Officers of the Royal Air Force Special Reserve.
5. Officers of the Auxiliary Air Force.

We will take each category in turn, and attempt to make the situation clear in brief language. Many points of more or less importance must be omitted for want of space, but the following remarks may serve as a guide to the Editor's correspondents in selecting the category most suited to their needs. When that choice has been made, it is a simple matter to procure the appropriate volume of regulations through any bookseller.

1. The Royal Air Force, Regular and Permanent

This is a career, and a very fine career, too. Moreover, it is not at all badly paid. A pilot officer starts on 16s. per diem, and a flight lieutenant, after two years' service in that rank, receives 28s. p.d. There are three ways of obtaining a permanent regular commission:—(a) Through Cranwell Cadet College, (b) through a recognised University, and (c) by selection after holding a short-service commission. In this article we are not considering promotions from the ranks.

2. Short-Service Commissions

This category may deserve the careful consideration of some of the Editor's correspondents. It is one way in which a man may be taught to fly at Government expense without taking up service flying as his life's career. His obligation is only five years on the active list, and four years on the R.A.F. Reserve. Gentlemen between the ages of 18 and 29 who believe that if only they could provide for themselves for the next five years, they would then find handsome openings in aerial transport for a good pilot (as we sincerely hope that there will be) might do much worse than apply for a short-service commission. The first step is to procure the form of application, Air Ministry form 696, and to do so a letter should be addressed to:—The Secretary, Air Ministry, Kingsway, London, W.C.2.

3. The Royal Air Force Reserve

This must be carefully distinguished from the R.A.F. Special Reserve Squadrons, which are dealt with below. Probably, at the present time, though not necessarily in the future, this category will be the one chosen by the majority of the Editor's inquirers. There are seven classes of officers in the R.A.F. Reserve, according to whether they are employed on flying or technical duties, and whether they have previously held a commission and received instruction or need training *ab initio*. This article is intended for the guidance of men who want to be taught to fly. If they want the Air Ministry to bear all responsibilities, financial and other, of their training, and if they do not want to spend five years in the R.A.F., and if they do not reside in Northern Ireland, then they will probably decide in favour of the R.A.F. Reserve.

The Reserve is not organised in squadrons. When an emergency arises its personnel will be merged in that of the R.A.F., and in that respect it resembles the Royal Naval Reserve. The initial period of service is for four years, which may be extended by mutual consent of the Air Ministry and the officer. When called up for service officers receive

exactly the same pay and allowances as the R.A.F. Pay and allowances are also given during annual training. Officers employed on flying duties also receive a retaining fee of £30 p.a. They are not obliged to wear uniform, except when serving with the R.A.F., and in that case they are given an outfit allowance of £25, unless a particular officer has recently held a regular R.A.F. Commission. The Government sends Reserve officers to a civil flying school either for a refresher course or for training *ab initio*. There are five such schools, the De Havilland school at Edgware, the Bristol school, the Armstrong Whitworth school at Coventry, the Blackburn school at Brough near Hull (where seaplane instruction can be given), and the Beardmore school at Renfrew, Glasgow. Training *ab initio* is given at present only at Edgware and Bristol.

The proper form of application can be obtained from the Secretary to the Air Ministry as above.

4. The R.A.F. Special Reserve

This force is the least advanced of all the martial flying organizations. Only one squadron is as yet in process of formation, *viz.*, No. 502 (Ulster) Bombing Squadron, which is located at Aldergrove aerodrome, near Belfast. Its C.O. is Squadron-Leader R. D. Oxland, and its equipment is Vickers Vimy bombers. Candidates for commissions who are resident in Ulster should apply to the Adjutant at Aldergrove.

The Special Reserve trains its officers to fly at the expense of the State and, therefore, in districts where a S.R. squadron is located the attractions which it offers to civilians are about equal with those of the R.A.F. Reserve. In certain other respects the attractions differ, and one man will prefer the Reserve and another the Special Reserve. At present the choice only affects Ulster, but presumably more S.R. squadrons will be formed in course of time. In the S.R. a single-engined bombing squadron is composed of a headquarters and three flights; a twin-engined squadron of a headquarters and two flights. In each the equivalent of one flight and also part of the headquarters is composed of regular personnel, and the C.O. is usually to be a regular officer. The squadrons are raised direct by the Air Ministry and take precedence after the R.A.F. and the R.A.F. Reserve. The uniform is the same as that of the regular R.A.F., and service dress must be provided. Pay is given when serving, and an officer receiving his first commission gets an outfit allowance of £40. The force is intended for home defence only, and owing to the large leaven of regulars, the squadrons should, when an emergency occurs, be able to get into the air almost as quickly as the regular squadrons can do. In situations of grave emergency, when a proclamation calling out the Air Force Reserve has been issued, officers of the Special Reserve can be called upon to serve overseas—a liability which few would wish to shirk.

5. The Auxiliary Air Force

This last, but not least, of the branches of the flying services is on very much the same footing as the Territorial Army, in that the units are raised by the County Associations. The wisdom of instituting both the S.R. and the A.A.F., and so creating confusion by the multitude of organizations, remains to be either vindicated or condemned by results. The Regulations for the Auxiliary Air Force, Air Publication 968, has just been issued, and is reviewed elsewhere. The following résumé may be of help to enquirers.

The Auxiliary squadrons are intended to appeal as widely as may be to the civil population, to popularise flying, and at the same time to provide a section of air defence at the least possible cost to the tax-payer. About 25 per cent. of the personnel in a squadron will be regulars, including the Adjutant and the stores officer. The C.O. and the other officers will be auxiliaries. Applications for commissions must be made on Form 1442 and forwarded, together with a copy of the candidate's birth certificate, to the C.O. of the squadron, either direct or through the County Association concerned. The minimum age for appointment as pilot officer or flying officer is 18 and the maximum is 25. After the application has been sent in, the next thing that happens is a personal interview and a thorough medical examination. If the candidate is then approved, the next question is his ability to fly. The A.A.F. does not undertake flying training, as the four preceding categories do. If the candidate possesses a licence, well and good. If not, then he must go away and learn to fly. After he has done so and has been commissioned, he can be refunded the cost of his flying instruction up to a limit of £115. If he fails to get his "ticket," the State has nothing more to do with him. This provision seems to be a

stumbling block to many, and may lead not a few into the Reserve or the Special Reserve who might otherwise have chosen the A.A.F. A candidate should reflect, however, that if the medical examination is thorough and the Reid apparatus is used, and he is still approved as a candidate, there should be very little doubt about his ability to learn to fly. He will have to insure himself during instruction, and it does not appear from the regulations that the cost of insurance can be recovered from the State. It is not impossible, however, that if the insurance is included in the receipt from the flying school, which must be produced, it might be passed. We should certainly advise comprehensive receipts to be procured, and we think the Air Ministry would be well advised not to be too inquisitorial when these receipts are presented. Despite the necessity of a candidate having to learn to fly, not at his own cost but at his own risk of failure, the Auxiliary Air Force will probably be a very popular body. Four squadrons are already in process of formation, No. 600, City of London Bombing Squadron; No.

601, County of London Bombing Squadron; No. 602, City of Glasgow Bombing Squadron, and No. 603, City of Edinburgh Bombing Squadron. The first two are at present at Northolt, but are to be moved to Hendon; No. 602 is at Renfrew, and No. 603 at Turnhouse, Midlothian. The formation of another squadron at Birmingham is contemplated during the present year.

The headquarters of the four squadrons are:—

- No. 600, City of London (Bombing) Squadron,
Finsbury Barracks, City Road, E.C.1.
- No. 601, County of London (Bombing) Squadron,
Elverton Street, Westminster, S.W.1.
- No. 602, City of Glasgow (Bombing) Squadron,
Headquarters, 52nd Lowland Divisional Signal
Company, Jardine Street, Glasgow.
- No. 603, City of Edinburgh (Bombing) Squadron,
25, Learmouth Terrace,
Learmouth, Edinburgh.

REGULATIONS FOR CITIZEN AIR FORCES

1. Regulations for Officers and Airmen serving in the Royal Air Force Special Reserve Squadrons. Air Publication 1108. 1st Edition, April, 1925.
2. Regulations for the Auxiliary Air Force and for County Associations. Air Publication 968. 1st Edition, October, 1925

THESE two volumes of Regulations have just been made public, and many of the regulations are common to the two Forces. For instance, officers of both Forces are at all times subject to the Air Force Act, whereas airmen are only subject to them when being trained or exercised, etc.; both Forces are open only to persons of pure European descent; and both are intended only for Home Defence. It would not be astonishing if the "colour bar" regulation aroused protests from India at the next Imperial Conference, seeing that during the war at least three Indians were commissioned as pilots in the R.F.C. and R.A.F., of whom Lieut. I. L. Roy, D.F.C. shot down nine enemy machines and was killed in air combat; Lieut. Malik Singh (now in the Indian Civil Service) was wounded, and 2nd Lieut. E. S. C. Sen was made a prisoner of war.

The distinction between the two Forces is briefly set forth in another article in this issue. The regulations governing the Special Reserve are the simpler of the two and are set forth in 299 paragraphs, while those governing the Auxiliary Air Force require 605 paragraphs, of which 280 deal with the County Associations. It may be noted that the Special Reserve is not regarded altogether as a separate force, because of the large proportion of Regular officers and airmen which will serve in it; while the A.A.F., although containing a certain number of regulars, is very much treated as a separate organization. The titles of the two volumes set forth this difference. In peace time an officer of the Special Reserve may be permitted by the Air Council to serve for periods with the Regular R.A.F. In fact, the Special Reserve is an expansion of the R.A.F. and aims at drawing a certain number of civilians into as close touch as possible with the Regular Force. There is nothing on the uniform of an officer or airman of the Special Reserve to indicate that he is not in the Regulars.

The Auxiliary Air Force, on the contrary, is to be a real citizen force with a minimum of Regular assistance or interference. The C.O. will be an Auxiliary officer with a Regular adjutant to help him; whereas the C.O. of a S.R. squadron will normally be a Regular. The adjutant will be responsible for the pay accounts of the unit, but during annual training the accountant officer, who will be an Auxiliary, will take them over from him. The stores officer will also be a Regular. The medical officer may be a Regular, an Auxiliary, or a civil medical practitioner, and the chaplain will be an Auxiliary.

The maximum ages for appointment are:—Pilot or Flying Officer, 25; Flight Lieutenant, 30; Squadron Leader, 35; Wing Commander, 40. As explained in another article in this issue, candidates must produce an "A" certificate (except in the case of accountant officers, etc.) before receiving a commission, but if that certificate has been taken for the express purpose of joining the A.A.F. the cost of tuition will be refunded up to a limit of £115 on the production of a receipt from the flying-school. The regulations do not provide for a refund of insurance premia during instruction, and this seems to be an unfortunate omission. If an officer has taken his "ticket" at a light aeroplane club, he may only send in a bill for £15. The club would get a bonus of £10, and the Air

Ministry would save £90 of the amount which it is prepared to pay in the matter. In these circumstances, if the candidate produced a receipt in which the cost of actual instruction and also of insurance were lumped together, we think that the Air Ministry would be well advised to pass it without too much inquisitorial examination. It would, nevertheless be much better to alter the regulation, paragraph 393, so as to regularise the payment of insurance during training. One official may interpret regulations broadly, and his successor may be a Shylock.

The Auxiliary Air Force is not a direct avenue to a commission in the R.A.F., A.A.F. officers may, however, be selected for Short Service commissions, and the chance of their entering Cranwell is also contemplated. In either case they cease to belong to the A.A.F. It seems unfortunate that specially efficient officers of the A.A.F., and also of the S.R., cannot by any means be transferred into the regular R.A.F. The army has owed much to officers who have obtained their regular commissions through the Militia, and the Air Ministry would, we consider, have been well advised to leave at least a loophole open for similar acquisitions. When the force is embodied after Royal Proclamation, the Air Council may post or attach an A.A.F. officer to a R.A.F. unit. A former R.A.F. officer may be taken from the A.A.F. for service with the R.A.F. in an emergency.

Among the compensations allowed to those who serve their country in citizen air forces are immunity from jury service and from service as a peace officer or parish officer.

The year's training will consist of periodical drills, including flying, instructional parades, and annual training. All officers of the general duties branch must do a minimum of 12 hours solo flying annually. The adjutant is the flying instructor of an A.A.F. unit. Every officer and airman of the A.A.F. is required to carry out annual training for a period of not less than eight or more than 15 days. A longer period is of course encouraged, but not obligatory.

Officers must provide themselves with service dress, which is distinguished from that of the regular R.A.F. by the letter "A" in gilt metal on the lapel of the jacket and on the shoulder straps of the greatcoat. The provision of full dress and mess dress is optional. Officers who retire or relinquish their commissions with leave to wear uniform will use "A.R." instead of "A." Flying kit is issued free, but remains the property of the State. The A.A.F. takes precedence after the Special Reserve.

Pay and allowances will be drawn by officers and airmen for days of actual attendance at annual training, at obligatory courses, when serving on a courtmartial, when specially called up for duty, for days of actual attendance at voluntary courses of instruction if approved by the Air Ministry, and for days (not more than 12 p.a.) of periodical flying duty, but not for instructional parades, etc. Officers, however, are regarded, for allowance purposes, as unmarried. An airman can draw bounties up to £3 p.a. for attending drills in excess of the minimum. A really smart man may earn the recruit's bounty of £2 10s., and also the airman's bounty in the same year. Bounties are also paid to officers and airmen

(excluding regular officers) of the best A.A.F. squadron of the year. An officer on joining, who has not held a commission under the Air Ministry or has not been granted one since August 1, 1919, receives an outfit grant of £40, and when a previous grant has been received a proportionate grant may be made.

The terms of service on the whole are not unlike those of the Territorial Army, and as that has been a success, there is no reason why the A.A.F. should not be a success also. There is no obligation to be found in the regulations, except that of insurance while learning to fly, which could in any way deter a patriotic young man from joining the force.

VACANCIES FOR AIRCRAFT APPRENTICES (R.A.F.)

THE Air Ministry announces that five hundred aircraft apprentices, between the ages of 15 and 16½ (extended in certain cases to 17 years) are required by the Royal Air Force for entry into the School of Technical Training, Halton, Bucks. They will be enlisted as the result of an open competition, and of a limited competition held by the Civil Service Commissioners and the Air Ministry respectively. Successful candidates will be required to complete a period of 12 years' service from the age of 18, in addition to the training period. At the age of 30 they may return to civil life or may be allowed to re-engage to complete time for pension.

Full information regarding the apprentice scheme, which offers a good opening to well-educated boys of obtaining a three years' apprentice course of a high standard and of following an interesting technical career, can be obtained on application to the Royal Air Force (Apprentice Department), 4, Henrietta Street, W.C.2.

Approximately 2,500 aircraft apprentices have already completed their training at the technical schools of the Air Force, and the annual output is now in the neighbourhood of 1,000 fully trained aircraftmen.

The *Open Competition*, for which a fee of 5s. is charged, is, as its name indicates, open generally to boys within the age limits who forward completed application forms to the Secretary, Civil Service Commission, Burlington Gardens, W.1, not later than March 4. The sons of officers and senior N.C.O.'s of the three services who wish to enter as aircraft apprentices receive special consideration. In their case

applications for nomination should be made to the Secretary, Air Ministry, London, W.C.2, not later than February 15.

All candidates for the *Limited Competition* must receive a nomination before they can attend this examination. These nominations must be received by the Air Ministry from the nominating authorities not later than May 4. If they are still at school, candidates should apply to their headmaster with a view to obtaining a nomination from the local education Authorities; if they have left school, application can be made to the Advisory Committee for juvenile employment in their area. There is no fee for this examination which is carried out at local centres in each area where boys are nominated.

The principal trades open to boys are carpenter-rigger, aero engine fitter and wireless operator mechanic. The apprentices are given a thorough training in their trade by highly qualified technical instructors and their general education is also carried on simultaneously by civilian schoolmasters.

During the training period the rate of pay is 7s. a week for the first two years and 10s. 6d. a week thereafter, until the apprentice has completed his training. Normally he is then posted to a unit for duty as an aircraftman, the rate of pay varying from 3s. 3d. to 5s. 6d. per day according to the success attained in the passing-out examination. In addition a few of special promise proceed to the Royal Air Force Cadet College for training as commissioned officers.

For the remainder opportunities arise later to volunteer to qualify in flying and become sergeant pilots.

Awards of Flight Cadetships to Aircraft Apprentices and of "Sir Charles Wakefield" Scholarship

THE Air Ministry announces:—Aircraft Apprentices E. White, J. E. Allen, J. E. MacCallum, N. A. Tait, R. C. Field, and G. H. H. Procter, from No. 1 School of Technical Training (Apprentices), Halton, have been selected for cadetships at the Royal Air Force Cadet College, Cranwell, on the results of the examinations held on completion of their three years' training as aircraft apprentices.

A "Sir Charles Wakefield" Scholarship, valued at £75, has been awarded to Flight-Cadet E. White.

The New Imperial Airways Agreement

WE publish below Sir Samuel Hoare's explanatory statement regarding a new agreement made between the Air Council and Imperial Airways, Ltd., supplementing the one concluded on May 15, 1924.

The new agreement modifies the original agreement by substituting for the minimum annual mileage of one million miles required to qualify for the subsidy a new composite minimum of 425,000,000 "horse-power miles," and also by providing that for the purpose of reckoning this minimum every mile performed by a marine aircraft shall count as a mile and a half. The agreement stipulates that the new minimum requirement shall be met in each year, without any such arrangement as that contained in the original agreement for averaging mileage in the earlier years.

The effect of these modifications should be to encourage the employment of more highly-powered machines and consequently to enable the company to develop towards a self-supporting basis as the subsidy decreases. The original mileage requirement was found in practice to put a premium on the employment of the small machine, the mileage of which counted the same for subsidy as that of a more powerful unit, whereas a more promising line of development, if civil air transport is to become economical and efficient, is in the direction of the use of the large high-powered machine.

The alteration as regards marine aircraft is due to the fact that the types hitherto used have been found to have so high a cost of operation in relation to their paying load that there has been insufficient inducement to develop overseas services. It is considered important to prevent such development from falling into abeyance; overseas air services, besides being necessary as links on routes which it is hoped to establish, may also prove eventually to have some positive advantages in operation as compared with overland services.

The amount of the subsidy and the general provisions of the original agreement remain unaltered, but the opportunity has been taken to make one or two small formal alterations in its provisions.

Last Year's Traffic by Junkers Air Lines

SOME interesting statistics have been issued concerning the air traffic operated by the Junkers Air Traffic Co. (now amalgamated in the new Deutsche Lufthansa). From January to the end of November, 1925, the company carried in 30,000 flights 80,000 passengers, 370 tons of freight and 250 tons of mail. During this time 2,812,500 miles were flown. Although the final statistics for these services are not yet to hand, one sees already that the Junkers work will have more than doubled that of last year, not only through the lengthening of the routes, but also through the introduction of the triple-screw machines, which have shown themselves to be very efficient. A fact of great interest is that during all this time the statistics of accidents show only one death, one seriously injured and five slightly injured passengers. A matter of special interest is the introduction by Junkers of night flying over the Baltic sea for seven months. In the first month the route Berlin-Stockholm was flown, but later it was extended to Copenhagen. In the last four months this route of Junkers has been run with 100 per cent. regularity, an achievement which has not yet been obtained before in the history of civil aviation. An idea of the enormous increase in air traffic during recent years may be obtained by a glance at the accompanying figures. The following numbers of passengers have been carried: In 1921, 2,230; 1922, 11,005; 1923, 26,509; 1924, 40,298; and in 1925, 93,242. From this it will be seen that the number of passengers carried in 1924 and 1925 respectively is greater than the sum of the passengers carried during the three preceding years. Flying on their routes last year during the months of service, the Junkers all-metal aeroplanes covered 17,500 miles daily.

An Autogyro Mishap

DURING a series of successful demonstration flights by Capt. F. Courtney with the Autogyro at Villacoublay on January 27, a mishap occurred which caused some damage to the machine. Courtney had just landed, when one of the wheels stuck in the mud, canting the machine sideways—then a strong gust of wind came and blew the machine completely over. Courtney was uninjured, and made some further demonstrations on February 2.

SIR CHARLES' GIFT.



At Stag Lane Aerodrome on Tuesday of this week, Sir Charles Wakefield, Bart., presented to representatives of the Lancashire Aero Club the de Havilland "Moth" generously promised the Club at a luncheon in Manchester in November last. In our group will be recognised Colonel Edwards of the Air Ministry, Sir Charles Wakefield, Commander H. Perrin, Mr. John Leeming, Chairman of the Lancashire Club, and Colonel Darby, whose firm built the "Cirrus" engine with which the "Moth" is equipped. The flying pictures show the "Moth" being stunted by Capt. Broad, the well-known de Havilland pilot.

A REMARKABLE RELIABILITY TEST

In order to establish a public demonstration of the unique reliability, and other qualities, of the Bristol "Jupiter" air-cooled aero engine, the Bristol Aeroplane and Motor Co. have been carrying out a remarkable reliability test during the last few weeks. Since January 4 last a Bristol "Bloodhound" biplane fitted with one of the latest type "Jupiter" engines has been making a series of endurance flights between

time, and the average petrol consumption worked out at 22.5 galls. per hr.

Further flights made in this test, up to the time of writing, are:—Jan. 25: Hours of running completed, 63 hr. 26 min.; number of miles flown, 7,050. Jan. 26: Hours of running completed, 67 hr. 11 min.; number of miles flown, 7,467. Jan. 28: Hours of running completed, 73 hr. 4 min.;



A REMARKABLE ENDURANCE TEST: The Bristol "Bloodhound," fitted with a Bristol "Jupiter" engine, which has been carrying out a series of endurance flights between Filton (Bristol) and Croydon since January 4. So far it has been in the air for 77 hr. 15 min., and has covered 8,595 miles.

Filton Aerodrome, Bristol, and Croydon Aerodrome. The engine—which is perfectly standard in every way—has been officially sealed by the Aeronautical Inspection Directorate, who are strictly controlling the test, and no replacements can be made upon the engine without breaking the seals. Three sets of sparking plugs are in use, and have been changed as occasion required.

By January 22 the number of hours' running completed was 53 hr. 48 min, and the number of miles flown amounted to 5,970. No engine replacements were made during that

number of miles flown, 8,133 (equal to the distance from London to Perth, Australia). Jan. 29: Hours of running completed, 77 hr. 15 min.; number of miles flown, 8,595.

Jan. 30: Hours of running completed, 81; number of miles flown, 9,008 (equivalent to more than five times the distance from Cape Verde Islands to Pernambuco, recently flown by the Spanish airmen).

So far no engine replacements have been made, and throughout the tests the average petrol consumption has not exceeded 22.5 galls. per hr.

Personals

Married

The marriage of Brigadier-General C. F. MURPHY, late R. Berks Regt. and R.A.F., son of the late Jerome Murphy and of Mrs. Murphy, Killurah-Glen, Castletown Roche, Co. Cork, and MARGUERITE MARIE NAGLE, eldest daughter of Mr. and Mrs. Garrett Nagle, of Byblos, Doneraile, Co. Cork, took place at Doneraile on January 20.

To be Married

The engagement is announced between JOHN BEVERLEY TOWNEND, R.A.F., eldest son of Mr. and Mrs. William Townend, of Wakefield and Harrogate, and PHYLLIS ROMANA, elder daughter of the late ARTHUR CADE BEMROSE and Mrs. BEMROSE, of 26, Oakwood Court, Kensington, and Solentia, Yarmouth, Isle of Wight.

A marriage has been arranged between Air Commodore FELTON VESEY HOLT, C.M.G., D.S.O., R.A.F., third son of the late Sir Vesey Holt, of Mount Mascal, and of Lady Holt, of 67, Cadogan Place, and MARION EDITH, only daughter of Mr. and Mrs. JAMES HENRY DUGDALE, of Cadogan Gardens S.W., and Rowney Priory, Hertfordshire.

The engagement is announced between Squadron-Leader JOHN LEACROFT, M.C., R.A.F., son of the late Dr. and Mrs. J. W. Leacroft, of Derby, and GLADYS UNDERHILL CUDDON, youngest daughter of the late Mr. G. U. Cuddon, Madras, India, and Mrs. Cuddon.

The engagement is announced between Flight-Lieut. FRANCIS LOGAN LUXMOORE, D.F.C., R.A.F., younger son of the late Mr. and Mrs. Edward Luxmoore, of Weybridge,

and DOROTHY JANE, daughter of Mrs. E. JOHNSTON, of Nether Denton, Low Row, Cumberland.

The engagement is announced between Captain S. R. PROCTOR, late R.F.C., youngest son of the Rev. F. B. Proctor, M.A., and the late Mrs. Proctor, of The Manor House, Sutton-on-Trent, Notts, and MADELEINE, only daughter of the late Mr. P. WARNFORD-DAVIS, J.P., and Mrs. WARNFORD DAVIS, of Prince Edward Mansions, Palace Court, W.

The engagement is announced between ATHOL G. STRATFORD TUKE, R.A.F., son of Col. G. F. Stratford Tuke, D.S.O., R.A., and Mrs. Tuke, and JOCELYN, daughter of Mr. and Mrs. J. C. SPARKS, of Heytesbury, Wilts.

The wedding of Captain J. B. WALMSLEY, D.F.C., barrister-at-law, and Miss DOROTHY BLEASDALE will take place at Mossley Hill Church, Liverpool, at a quarter to two o'clock on February 9.

The marriage of Flying Officer RALPH WOODCOCK GIFFORD, LYWOOD, son of Col. Lywood, of Alverstoke, to Miss MARGARET SMITH, younger daughter of Mr. and Mrs. F. J. Smith, of Alverstoke, will take place at All Souls' Church, Langham Place, on February 16.

Death

WING-COMMANDER T. O. LYONS, O.B.E., R.A.F., died on February 1, at No. 4 Stores Depot, R.A.F., Ickenham, from after-effects of service in the Great War and Iraq later.

Item

The Right Hon. Sir Samuel Hoare, Minister for Air, and Lady Maud Hoare returned to their residence in Cadogan Gardens on February 1, from Switzerland.

A FINE AMERICAN ALTITUDE FLIGHT

ON January 29 last Lieut. John A. Macready, the well-known American pilot, made a magnificent attempt to beat the world's altitude record of 39,596 ft., established by the French pilot Callizo. At first it seemed as if he would be successful in achieving his object, but, when at an altitude of 35,900 ft. — where Macready reported a temperature of 50 deg. below zero—the supercharger, which was fitted on his machine, developed trouble, and he was forced to descend. On landing, Macready appeared to be little the worse for his experience.

He was using a special altitude 'plane, known as the XCO5, which we illustrate herewith. We publish also some notes on this machine, by A. M. Jacobs, from the "U.S. Army Air Service News Letter," which, we think, may be of interest.

The P-53, Le Pere biplane, twice in tests of altitude equipment taken to heights which secured for the United States world altitude records, having well served its purpose, is about to be retired in favour of a more modern design. Its successor, the XCO5, designed and built by the Engineering Division in 1923, is at present undergoing remodelling with the expectation of being ready for the testing of altitude equip-

fastens about the pilot's neck and extends to the cowling. Even the opening about the socket of the control stick is closed over with corduroy, the whole interior being made snug against the entrance of outside winds or draughts. Through the cowling, which is of transparent celluloid, the pilot looks down upon the instruments and controls, with each of which, some time during the flight, his eyes or hands must be busy. There he sees the altimeter, the tachometer, the air speed indicator, the variable engine pressure gauge, which indicates the difference of air pressure in the carburettor as altitude is gained, the fuel level gauge, the fuel pressure gauge, the water thermometer for water leaving the engine, the water thermometer for water leaving the radiator, the oil-pressure gauge, the thermometer for oil entering the engine, the thermometer for oil leaving the engine, the clock, the oxygen flow regulator, the Liberty engine ignition switch, the battery control switch—the plane is equipped with a dual set of batteries so that, if one runs down, the pilot can switch to the second—the emergency gasoline hand pump, the radiator shutter control, the throttle control, the spark control, the carburettor mixture



[U.S. Air Service Photo]

MACREADY'S ALTITUDE 'PLANE: The XCO5A (400 h.p. "Liberty"), developed by the U.S. Engineering Division, McCook Field on which Lieut. John A. Macready (standing by machine) attained an altitude of nearly 36,000 ft. last week.

ment in the near future. In looking about for a plane which, would most efficiently fulfil the conditions for altitude work several features governed. It had been decided that the new choice must be designed for a supercharger, must be lighter per wing-span ratio than the old Le Pere and adapted to being fitted with high lift wings and a propeller of large diameter. The XCO5, more than any other plane, seemed to answer this description and to more generally lend itself to the modifications which would be necessary.

Of first importance, were the wings. The type selected to give the high lift desired was the Joukowski StAe-27A. A set of wings to this design was built in the Engineering Division shops. Of wood and fabric construction, they are heavily cambered, being extremely thick at the leading edge and tapering sharply to the rear. Gap and stagger are pronounced. They present a total area of 600 sq. ft., with an aspect ratio of 10. Mounted on the fuselage on the XCO5, they reduce the weight-span ratio to a much lower value than the plane's original wings. With these wings it is planned to use a detachable-blade aluminium alloy propeller, 10 ft. 6 in. in length with pitch adjustable on the ground.

The inside of the fuselage of the plane has also undergone considerable remodelling in preparation for the frigid journeys.

The liquid oxygen flasks, in former flights placed in the rear cockpit, have been moved to the rear of the rear cockpit with tubes and regulators carried through to the front cockpit. In the one-man altitude tests, the rear cockpit will carry the recording barographs and thermographs and be sealed over. The pilot's cockpit has been completely lined, the floor and lower half of the walls with plywood, the upper half with quilted felt corduroy which, coming around the back of the pilot's seat, forms a taut cockpit covering which

control, the supercharger blast gate control, the gasoline shut-off valve and, last but not least, the airplane stick and rudder controls. In addition, will be mounted a thermometer to give the air temperature inside the cockpit and a second altimeter registering the altitude according to the Federation Aeronautique Internationale reckoning.

In former flights, a temperature as low as 82½ degrees below zero, Fahrenheit, had been encountered. To further protect the pilot from the extreme cold, an extra heating apparatus has been mounted on the exhaust manifold on the left side of the plane so that the cold air passing over the hot manifold and becoming heated, is led through a tunnel and thence into a flexible conduit which, extending into the interior of the cockpit, ends near the control stick. In this way, the warm air will be directed to the pilot's hands and the centre part of his body, though because the conduit is flexible, he may change that direction as he chooses. Dampers in the tunnel make it possible to keep the temperature from becoming too warm at the lower altitudes, a danger which, of course, will not exist higher up.

The XCO5 is powered with the 400 h.p. Liberty engine. A submerged fuel system has been adopted for altitude work; that is, the fuel pump has been placed at a level lower than the gasoline tank, thus accomplishing gravity feed from tank to pump. At high altitudes, the boiling point of fuel is reduced close to its vaporization point. Therefore, any added negative pressure imposed on the fuel by its lifting to the pump, is apt to cause vaporization, in which condition it is impossible to pump it to the engine. By submerging the pump beneath the level of the tanks, the duty of the pump is reduced to merely discharging the fuel, which, backed by an even gravity pressure, more easily retains its normal liquid

condition. The regular Liberty starting system has been removed and an 8-volt ignition system installed to lighten the plane for these tests.

Since the Liberty engine, which delivers 400 h.p. at sea level, has an output of but 50 h.p. at 35,000 ft. unsupercharged, a supercharger is a prime requisite of altitude work. The General Electric Form F, 20,000-ft. side type supercharger used in previous tests, with certain modifications, has been installed. The supercharger is an air compressor which keeps the air pressure in the carburettor at sea level pressure at heights where, owing to the natural decrease in the air pressure, the horsepower gradually falls away to but a fraction of its original output. In former supercharger installations, much difficulty was experienced with pre-ignition of the engine. This often became so pronounced that the plane had to be brought to earth. It was suspected that a richer mixture with supercharger at altitude was necessary. This was found to be true but the principal difficulty was the overheating of the mixture due to the heat generated in the supercharger itself. Due to the increase of temperature created by the compression in the supercharger, it was necessary to interpose an intercooler between the supercharger outlet and the carburettor in order to obtain satisfactory engine performance. The intercooler, in the form of a honeycomb radiator, was placed on the side of the aeroplane. It was also found that, due to poor conductivity of the air at high altitudes, additional radiating surface for engine cooling was required. This, with the correction of mixture, put an end to pre-ignition.

Though much has been accomplished in the refinement of plane and engine for altitude purposes in the last several years aside from improvement of oxygen equipment, little has been done toward enabling man to increase his own ceiling or towards gaining normal efficiency for his body in the altitudes which he has already succeeded in reaching. A seemingly almost insurmountable difficulty lies in the task of making up to the human body for the decrease in air pressure and the limited amount of oxygen his lungs are capable of consuming at such heights. The cold, though a severe drain on the system with the best protection possible, is more easily met. To prepare for it, Lieutenant Macready wears over his uniform, a heavy suit of woollen underwear and over that a thick heavily padded, leather-covered suit of down and feathers.

Then, fur-lined gloves, fleece-lined mocassins, over the boots and a leather head mask lined with fur, which, with the oxygen mask, completely covers the face, completes the costume. The goggles are coated on the inside with anti-freezing gelatine supposed to function to 60 degrees below zero. Fahrenheit.

Of course, electrically-heated suits are not practical for such flights, for they mean but another system of wires and switches for the aviator to add to his already complicated list of mechanisms and controls and should anything go wrong with the wiring, the suffering from the cold would be too intense to permit of continuation of the experiment, even if it did not, in conjunction with the other adverse conditions, cause unconsciousness.

THE ROYAL AIR FORCE

London Gazette, January 26, 1926

General Duties Branch

The following are granted permanent commns. as Flight-Lieutenants, Jan. 1.—B. C. H. Cross, D.F.C.; R. J. M. De St. Leger; F. H. E. Reeve. The following are granted short service commns. in the ranks stated, with effect from and with seniority of Jan. 16:—Flying Officer (for seven years on the Active List) R. E. H. Horn (Lieut., Indian Army, ret'd.). Pilot Officers on probation (for five years on the Active List)—C. P. Ashton-Jinks, W. L. Bateman, P. S. Cook, C. H. L. Evans, C. V. Godfrey, F. Gower-Jones, J. A. Grieves, V. G. A. Hatcher, W. A. Hills, V. W. Huggett, C. S. John, H. C. Johnson, C. G. Lucas, D. Mackenzie, A. F. Merritt, D. H. A. C. D. Patton-Bethune, W. M. Phillips, W. J. Pickard, E. G. Searson (Sec. Lieut., R.A.), T. A. L. S. S. Tunks, G. A. Underdown, H. J. Walker, W. F. Ward.

Lieut. A. R. Braybrooke, K.S.L.I., is granted a temp. commn. as a Flying Officer on seconding for four years' duty with R.A.F.; Jan. 16. Pilot Officer G. D. Green is promoted to rank of Flying Officer; Aug. 14, 1925. Pilot Officer on probation A. C. Watkins is confirmed in rank; Jan. 18. Flying Officer B. M. T. S. Leete is transferred to the Reserve, Class A; Jan. 28.

The following relinquish their short-service commns. on account of ill-health (Jan. 27):—Flying Officer (hon. Flight-Lieut.) C. W. Dann, M.C. (Capt., Ind. Army, ret'd.); Pilot Officer on probation C. Taite. The following relinquish their temp. commns. on return to Army duty:—Flying Officer A. W. Henderson (Lieut., R.A.); Jan. 16. Flying Officer T. W. Shortbridge (Lieut. Green Howards); Jan. 19. C. F. L. Holford, Lieut., R.M., Flying Officer, R.A.F.) relinquishes his temp. commn. on return to the R.M.; Jan. 21, 1920.

AUXILIARY AIR FORCE

General Duties Branch

The following to be Squadron-Leader:—No. 602 (City of Glasgow) (Bombing) Squadron.—J. D. Latta, M.C., to command the Squadron; Feb. 1.

Medical Branch

The following to be Flight-Lieutenant:—No. 601 (County of London) (Bombing) Squadron.—J. D. Driberg, O.B.E., M.C., F.R.C.S.; Jan. 26.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron-Leader W. W. Hart, M.B.E., to H.Q., Coastal Area; 28.1.26. Flight-Lieutenants: E. L. Ardley, to No. 24 Sqn., Kenley; 26.1.26. L. F. Pendred, D.F.C., to Central Flying Sch., Upavon; 22.1.26. L. Wanless-O'Gowan, to R.A.F. Depot; 4.2.26. A. M. Blake, A.F.C., to R.A.F. Depot, on transfer to Home Estab.; 15.1.26. A. R. M. Rickards, A.F.C., to R.A.F. Depot, on transfer to Home Estab.; 31.12.25. W. A. B. Savile, to Air Ministry; 4.2.26. A. R. M. Rickards, A.F.C., to R.A.F. Cadet Coll., Cranwell; 1.2.26. J. Bussey, to H.Q., Inland Area; 2.2.26.

Flying Officers: M. E. B. P. Storrie, to No. 208 Sqn., Egypt; 15.1.26. R. E. H. Horn, to No. 2 Flying Training Sch., Digby, on appointment to a Short Service Commn.; 16.1.26. A. R. Braybrooke, to No. 2 Flying Training Sch., Digby, on appointment to a Temp. Commn. on being seconded from the Army; 16.1.26. J. Noonan, D.S.M., to R.A.F. Cadet Coll., Cranwell; 19.1.26. G. Combe, to No. 17 Sqn., Hawkinge; 3.2.26. E. H. Alliot, to Electrical and Wireless Sch., Flowerdown; 25.1.26. R. Beresford, to Elect. and Wireless Sch., Flowerdown; 25.1.26. E. C. Dearth, to R.A.F. Cadet Coll., Cranwell; 31.1.26. H. M. Groves, to No. 31 Sqn., India; 15.1.26. C. J. Sims, D.F.C., to Reception Depot, West Drayton; 1.2.26. R. Menzies, to No. 2 Sqn., Manston; 1.2.26. C. B. McIntyre, to No. 2 Flying Training Sch., Digby; 1.2.26. H. R. McL. Reid, D.F.C., to R.A.F. Cadet Coll.,

Cranwell; 1.2.26. W. C. P. Bullock, to H.M.S. Eagle; 20.1.26. J. F. Bythell, to Elect. and Wireless Sch., Flowerdown; 27.1.26.

Pilot Officers: J. A. Tindall, to No. 2 Flying Training Sch., Digby, on appointment to a Permanent Commn.; 18.1.26. G. D. Middleton and A. G. Pickering, to No. 481 Flight, Malta; 14.1.26. A. T. S. Studdert, to No. 1 Sqn., Iraq; 15.1.26. C. P. Ashton-Jinks, W. L. Bateman, P. S. Cook, C. H. L. Evans, C. V. Godfrey, F. Gower-Jones, J. A. Grieves, V. G. A. Hatcher, W. A. Hills, V. W. Huggett, C. S. John, H. C. Johnson, C. G. Lucas, D. Mackenzie, A. F. Merritt, D. H. A. C. D. Patton-Bethune, W. M. Phillips, W. J. Pickard, E. G. Searson, L. S. S. Tunks, G. A. Underdown, H. J. Walker, and W. F. Ward, all posted to No. 2 Flying Training Sch., Digby, on appointment to Short Service Commns. (on probation); 16.1.26. G. E. G. Lywood, to No. 17 Sqn., Hawkinge; 28.1.26. S. H. C. Grey, to No. 2 Flying Training Sch., on appointment to Short Service Commn. (on probation); 23.1.26. R. H. Donkin, to No. 2 Flying Training Sch., Digby, on appointment to a Short Service Commn. (on probation); 22.1.26. E. D. MacL. Hopkins, to No. 2 Flying Training Sch., Digby, on appointment to a Permanent Commn.; 26.1.26. J. H. C. Purvis, to No. 25 Sqn., Hawkinge; 27.1.26.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—Lieutenants (Flying Officers, R.A.F.): A. A. Murray, to Eagle and for 422 Flight; 14.1.26. G. R. M. Robertson, to Columbine by R.A.F. Base, Leuchars; 26.1.26.

ROYAL AERONAUTICAL SOCIETY

(Official Notices)

Endowment Fund.—The recent appeal on behalf of an Endowment Fund by Sir Samuel Hoare and Air Vice-Marshal Sir Sefton Brancker has been generously responded to by Sir Charles Wakefield, who has contributed £250, and by "A Friend of Aviation," who has contributed £100. It is hoped that this magnificent start will be followed up quickly so that the Society can immediately put in hand the schemes

for the supplying of information to the new technical grade of Associate, and can also proceed with the very necessary propaganda work through the new branches which are being formed.

In connection with the Endowment Fund it will be remembered that Lord Cowdray has generously offered a sum of £50 a year for five years, if nine others will follow his example.

J. LAURENCE PRITCHARD,

Honorary Secretary



CORRESPONDENCE

THE AIRCRAFT ENGINEER.

[2116]. I find that in the article published in THE AIRCRAFT ENGINEER, I omitted to give the references to the Technical Memoranda issued by the Aeronautical Research Committee.

These are—

R. and M., No. 916.—Slot Control on an Avro with standard and balanced ailerons. By F. B. Bradfield of the R.A.E.

R. and M. No. 856.—Some Experiments on a Model Biplane having Slotted Wings with Particular Reference to the Control at Low Speeds. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc.

R. and M. No. 968.—Full Scale Test of a New Slot and Aileron Lateral Control. By H. L. Stevens, B.A., of the R.A.E.

F. HANDLEY PAGE.

Cricklewood, London, N.W.2.

February 2, 1926.

[In connection with the article by Mr. Handley Page in THE AIRCRAFT ENGINEER last week, an error crept in which was not noticed in time to be corrected. In table 3 on p. 3, the last two divisions were headed: "Flap angle, -10° ," and "Flap angle, -20° ." These should have read: "Flap angle $+10^{\circ}$ " and "Flap angle, $+20^{\circ}$," respectively. In the graph published in the right-hand column, next to table 3, the positive signs were correctly given.—ED., THE AIRCRAFT ENGINEER.]

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The Aircraft Engineer

THE first issue of our technical supplement, published last week, has met with a most gratifying response from our readers, a large number of whom have written in to express their appreciation. A discussion, in the form of correspondence, of the articles published must be deferred to a later date.

London—Cape Town Survey Flight.

THE news of Alan Cobham's London—Cape Town Survey Flight this week is somewhat more lively than it has been hitherto. It is to be hoped that, having now got so far—he has only some 900 miles more before him—Dame Fortune is not going to be unkind. They left Broken Hill on January 29 for Livingstone, 290 miles away, and flew over the famous Victoria Falls en route. A really thrilling incident was experienced when they attempted to obtain some unique films of the falls. This is rendered somewhat difficult owing to the exceptionally heavy clouds of spray sent up from the 400 ft. torrent. Cobham flew along the brink of the falls and awaited an opportunity of the wind blowing the spray clear. At last this occurred and he dived down along the deep ravine and got some good pictures—then the spray shot up again, enveloping and drenching the machine. This evidently caused water to get into the carburettor, for suddenly the engine momentarily stopped. They were naturally in an exceedingly precarious position but fortunately the engine picked up again and Cobham was able to "hoik" the machine out of the ravine and make for a safe landing spot. We trust the resulting pictures will be worth this unpleasant experience. On January 31 they flew 240 miles to Bulawayo, where they received the most enthusiastic reception of the whole tour—except for the one they were given when a landing was effected on the S.A. Air Force aerodrome at Pretoria on the evening of February 2. Here they were greeted by Colonel Sir P. Van Ryneveld, D.S.O., M.C., who flew from England to Cape Town in 1920. For the first time during the whole flight trouble was experienced in getting the machine to take off with full load in the rarefied conditions prevailing along certain parts of the route. This occurred at Bulawayo, and after two unsuccessful attempts to rise—which almost terminated in the same tree which brought Sir Van Ryneveld's machine down—Cobham decided to "throw overboard" Mr. Emmott (cinematographer) and 200 lbs. of fuel, and thus got safely away.

Schneider Cup Entries

It begins to look as if, after all, there may be British challengers for the Schneider Cup Race, which is dated to take place at Norfolk, Virginia, on October 24, 1926. As we briefly recorded last week, Mr. S. E. Saunders has decided to enter for this year's race, and is at present engaged on the design of a challenger. Ever one of our best sportsmen, Mr. "Sammy" Saunders, has repeatedly shown his willingness to help where aviation is concerned, and it has been mainly due to his hospitality that in the Schneider Cup Races held in this country, the competitors were housed in adequate quarters. He has even been known practically to rebuild a

damaged foreign competing machine in his shops. It is not, therefore, surprising that Mr. Saunders has come forward when a total absence of British challengers was threatened, and all will wish him the best of luck with his new designs, which are believed to incorporate a number of unorthodox features.

Yet another entry is now reported, this time by Colonel Bristow, at one time of Ogilvie and Partners. Colonel Bristow's entry is rumoured to be a monoplane, but at the moment it is not possible to ascertain anything very definite about it. If Great Britain is to have a sporting chance in the race this year, it is essential that the machines should be finished in good time, and it is highest time that the pilots should be chosen and start training. The sooner, therefore, the whole subject is taken out of the atmosphere of secrecy which at present surrounds it, the better.

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PUBLICATIONS RECEIVED

The Official Gazette of the United States Patent Office. January 5, 1926. The United States Patent Office, Washington, D.C., U.S.A.

Revue Juridique Internationale de la Locomotion Aérienne. October, November, December, 1925. Per Orbem, 4, Rue Tronchet, Paris.

Onderzoek Naar de Bruikbaarheid van het Hoogtevliegtuig Voor Verkeersdoeleinden. By B. L. Voskuil. J. Waltman, Junr., Delft, Holland.

Royal Air Force Pocket Book and Diary, 1926. Gale and Polden, Ltd., 2, Amen Corner, London, E.C. Price, bound in cloth in R.A.F. colours, 2s; bound in royal blue leather, 3s (postage extra).

A Method of Starting Engines of Light Aeroplanes. Air Publication 1163. First Edition. June, 1925. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 2d. net.

Regulations for the Royal Air Force Reserve. Air Publication 938 (Second Edition, November, 1925). H.M. Stationery Office, Kingsway, London, W.C. 2. Price 4d. net.

Regulations for the Auxiliary Air Force and for County Associations. Air Publication 968 (First Edition, October, 1925). H.M. Stationery Office, Kingsway, London, W.C. 2. Price 3s. 6d. net.

A Commercial and Historical Atlas of the World's Airways. Francis J. Field, Ltd., 57-58, New Street, Birmingham. Price 2s. 6d. net.

Eleventh Annual Report of the National Advisory Committee for Aeronautics, 1925. United States National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924.

Published February 4, 1926

- 23,730. SIR W. G. ARMSTRONG, WHITWORTH AND CO., LTD., and R. MORRISON. Sighting-devices for director firing. (245,506.)
24,075. A. H. R. FEDDEN and BRISTOL AEROPLANE CO., LTD. Construction of joint comprising members of different thermal expansions. (245,528.)

APPLIED FOR IN 1925.

Published February 4, 1926

- 1,516. C. R. FAIRY. Radiators. (245,600.)
9,221. W. T. HUGHES. Shock-absorbing apparatus. (245,645.)

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